

## CONTINUING MEDICAL EDUCATION ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

### Medical Imaging Quiz – Case 59

A 48-year-old man was admitted to the emergency department due to fever for the last three days and cough, dyspnoea and thoracic pain the last a few hours. None medical history referred. Clinical examination revealed body temperature 39.5 °C, SatO<sub>2</sub> 95% and pathological auscultatory sounds, crackles at the right lung. Laboratory tests revealed elevated leucocytes and CRP. Chest X-ray was performed and a cavity lesion with air fluid level was seen (fig. 1). Computed tomography (CT) scan confirmed imaging findings, a cavity of the right lower lung with a bronchial fistula (fig. 2). Patient was administered empiric antimicrobial therapy and CT-guided percutaneous drainage was decided supplementary as a diagnostic and treatment method. Pus cultures isolated *Staphylococcus* MRSA and the antimicrobial therapy was modified in ceftaroline.

#### Comment

*Lung abscesses are circumscribed collections of pus within the lungs. Management and treatment of abscesses is difficult. Their incidence and mortality is decreased due to availability of antibiotics. The elderly, immunocompromised (secondary to HIV/AIDS and iatrogenic immunosuppression), malnourished, debilitated, and, of*



**Figure 1.** Chest X-ray shows thick walled right lower lobe cavitory lung lesion with air fluid level.

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**E. Botsa,  
I. Thanou,  
E. Barmpouti,  
K. Antoniadis,  
L. Thanos**

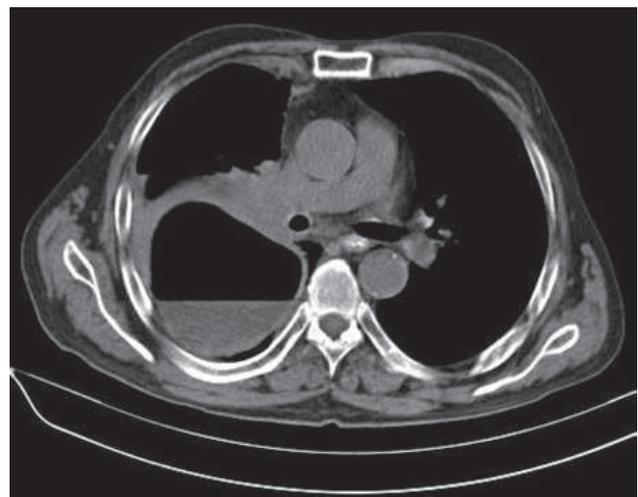
*Department of Interventional Radiology  
and Diagnostic Imaging, "Sotiria"  
General Hospital of Chest Diseases,  
Athens, Greece*

*course, those who do not have access to antibiotics are particularly susceptible and have the worst prognosis.*

*Lung abscesses usually occur from liquefactive necrosis of tissue. Their presentation is usually non-specific and generally similar to a non-cavitating chest infection. Symptoms include fever, cough and shortness of breath. Peripheral abscesses may also cause pleuritic chest pain. In some cases, erosion into a bronchial vessel may result in a sudden and potentially life-threatening massive hemoptysis.*

*Lung abscesses are divided into primary and secondary, as they differ not only in etiology, but also microbiology and prognosis. A primary abscess is one which develops as a result of primary infection of the lung. They most commonly arise from aspiration, necrotizing pneumonia or chronic pneumonia, e.g., pulmonary tuberculosis, immunodeficiency.*

*In patients who develop abscesses as a result of aspiration, mixed infections are most common, including anaerobes. Micro-*



**Figure 2.** Chest CT scan reveals pulmonary cavity with air-fluid level in the right lower lobe. Pulmonary consolidation is remarkable adjacent to the cavitory lesion.

organisms prone to causing significant necrotizing pneumonia resulting in cavitation and abscess formation are *Staphylococcus aureus*, *Klebsiella* sp, *Klebsiella pneumoniae*, *Pseudomonas* sp, *Proteus* sp. In immunocompromised patients organisms that may also be implicated include *Candida albicans*, *Legionella micdadei*, and *Legionella pneumophila*, *Pneumocystis carinii*.

A secondary abscess is one which develops as a result of another condition such as bronchial obstruction, inhaled foreign body, hematogenous spread (bacterial endocarditis, IV drug use), direct extension from adjacent infection.

As aspiration is the most common cause of pulmonary abscesses, it is no surprise that the superior segment of the right lower lobe is the most common site of infection. The classical appearance of a pulmonary abscess is a cavity containing a gas-fluid level. In general, abscesses are round in shape and appear similar in both frontal and lateral projections. Additionally, all margins are equally well seen, although adjacent consolidation may make the assessment of this difficult. These features are helpful in distinguishing a pulmonary abscess from an empyema.

Ultrasound does not play a routine role in the assessment of lung abscesses as any aerated intervening lung will prevent visualization. Peripheral abscesses abutting the pleura or with only compressed or consolidated lung may, however, be visible, and should not be mistaken for an empyema. The consolidated lung may mimic a fluid collection with low-level echoes. CT is the most sensitive and specific imaging modality to diagnose a lung abscess. Contrast should be administered, as this enables the identification of the abscess margins, which can otherwise blend with surrounding consolidated lung. Abscesses vary in size and are generally rounded in shape. They may contain only fluid or have a gas-fluid level. Typically, there is surrounding consolidation, although with treatment the cavity will persist longer than consolidation. The wall of the abscess is typically thick and the luminal surface irregular. Bronchial vessels and bronchi can be traced as far as the wall of the abscess, whereupon they are truncated.

Lung abscesses are usually managed with prolonged antibiotics and physiotherapy with postural drainage. Surgical resection is the definitive treatment in cases that are refractory to conservative management or those complicated by hemoptysis, empyema or suspected malignancy. Percutaneous drainage under CT guidance has also been advocated in selected cases. Larger abscesses (>4 cm

in diameter) are less likely to be cured with medical management only and have a higher mortality irrespective of treatment.

Complications of surgery or percutaneous drainage include empyema, bronchopleural fistula, hemorrhage, pneumothorax.

Despite treatment, abscesses continue to have a high mortality (15–20%). This is particularly the case in nosocomial infections, which account for the majority of deaths, presumably due to the combined effect of pre-existent illness and the higher prevalence of virulent antibiotic-resistant strains, particularly *P. aeruginosa*, *S. aureus*, and *Klebsiella pneumoniae*.

Imaging differential considerations include empyema, bronchogenic carcinoma, pulmonary metastasis, pulmonary granulomatous disease, large infected pneumatocele, cavitating pneumonia, pulmonary tuberculosis.

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Corresponding author:

L. Thanos, Department of Computed Tomography, "Sotiria" General Hospital of Chest Diseases, 152 Mesogeion Ave., 115 27 Athens, Greece  
e-mail: loutharad@yahoo.com